

2.1 Getting Started

Objectives:
Warm up to the ideas of the investigation

Textbook page: 97

By now, you have some idea of what a function is. Here are a few functions.

- SQRT(x) = the square root of a real number x
- SQR(x) = the square of a real number x
- REC(n) = the reciprocal of a real number n
- BD(p) = the birthday of a person p
- SUM(a, b) = the sum of two numbers a and b
- PR(a, b) = the product of two numbers a and b
- QUO(a, b) = the quotient of two numbers a and b

1. If possible, find the value of each expression. If an expression cannot be evaluated, explain why not.

- | | |
|-------------------------------------|-------------------------------------|
| a. PR(3, 4) 12 | b. QUO(3, 4) 0.75 |
| c. QUO(6, 8) 0.75 | d. QUO(0, 23) 0 |
| e. QUO(23, 0) Not Possible | f. SQR(SQRT(5)) 5 |
| g. SQR(SQR(5)) 5 | h. SQR(SQR(-5)) Not Possible |
| i. SQR(SQR(-5)) 5 | j. QUO(P(3,4), P(2,6)) 1 |
| k. BD(Pierre Fermat) Aug. 17 | l. BD(3) Not Possible |
| m. SQR(SUM(9, 16)) 5 | n. SUM(SQRT(9), SQRT(16)) 7 |
| o. SQR(BD(Isaac Newton)) NP | p. SQR(PR(-2, 1/3)) NP |
| q. REC(2) 1/2 | r. REC(REC(2)) 2 |
| s. REC(REC(REC(2))) 1/2 | t. REC(0) Not Possible |

Pierre de Fermat



Pierre de Fermat

Born August 17, 1601
Beaumont-de-Lomagne,
France

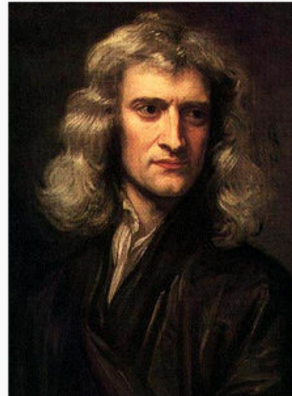
Died January 12, 1665 (aged 63)
Castres, France

Residence France

Nationality French

Fields Mathematics and Law

Sir Isaac Newton



Godfrey Kneller's 1689 portrait of Isaac Newton (age 46)

Born 25 December 1642
[NS: 4 January 1643]^[1]
Woolsthorpe-by-Colsterworth
Lincolnshire, England

Died 20 March 1727 (aged 84)
[NS: 31 March 1727]^[1]
Kensington, Middlesex,
England

Residence England

Homework: p 98 2-8 (skip 3), 11

2. A mystery function $m(x)$ has the inputs and outputs below. How can you define the function?

$$m(\pi) = 3 \quad m(2.9) = 2 \quad m(5) = 5 \quad m(11.6) = 11 \quad m(-1.3) = -2$$

4. Find the natural domain of each function. Describe the domain in detail.

- | | | |
|--------|----------------------------------|--------|
| a. QUO | b. SQR | c. QUO |
| d. REC | e. $f(x) = \frac{\sqrt{x}}{x-2}$ | |

4. Find the natural domain of each function. Describe the domain in detail.

a. QUO

b. SQRT

c. QUO

d. REC

e. $f(x) = \frac{\sqrt{x}}{x-2}$

The key property of a function is that it turns each input into a well-defined output. The inputs are members of the domain. The set of all outputs is the *range* of the function.

5. For each function in Problem 4, you defined a domain. Using that domain, describe each function's range.

6. Suppose each function gives an output of 9. Do you have enough information to determine the input? Explain.

a. PR

b. SQRT

c. SQR

7. If possible, find two different inputs for each function that give the same output.

a. SQR

b. BD

c. QUO

d. SQRT

e. REC

8. Use the definition of function D below.

$$D(x, y) = \sqrt{x^2 + y^2}$$

Find each value.

a. $D(0, 0)$

b. $D(3, 4)$

c. $D(-3, 4)$

d. $D(4, 3)$

e. Find another input that makes $D(x, y) = 5$.

f. **Take It Further** Draw a graph of all the coordinate pairs (x, y) that make $D(x, y) = 5$.

11. Use the definitions of functions f and g below.

$$f(x) = 3x - 7$$

$$g(x) = \frac{x+7}{3}$$

Find each value.

a. $f(10)$

b. $g(23)$

c. $f(f(0))$

d. $g(g(-28))$

e. $f(g(172))$

f. $g(f(0.27))$

g. $f(g(f(g(1000))))$